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EXAMINER

KEBEDE, BROOK

ART UNIT

PAPER NUMBER

2823

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PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

BL

Office Action Summary	Application No. 10/527,743	Applicant(s) MARUYAMA, YASUSHI	
	Examiner Brook Kebede	Art Unit 2823	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 19 June 2007.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-18 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-18 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Objections

1. Claim 14 is objected to because of the following informalities:

Claim 14 recites the limitation “wherein the collective lens is placed at a position shifted more toward the center part of the imaging area as a distance from the center of the imaging area to a pixel thereof increases” in lines 5 and 6.

However, it is not clear whether there is proper antecedent basis can be established for “the center part of the imaging area” and “the center of the imaging” because the position of the imaging area is not adequately defined. Appropriate correction is required.

Claim Rejections - 35 USC § 112

2. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

3. Claims 1-13 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

The rejection that was mailed on February 27, 2007 is maintained and repeated herein below as of record.

Although an attempt has been made to identify all instances of claim language non-compliance, such identification is extremely burdensome due to the large number of instances. Examples are provided herein below. Since such noncompliance confuses the claims to the extent that not all of the problems are ready apparent, then upon amendment, if an alternative

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interpretation of claim language requires a change in the rejection, the new rejection may properly made final.

Claim 1 recites the limitation “wherein the pixel,” in line 3, “surface symmetry in a pixel,” in line 6, “imaging area to a pixel,” in lines 9-10, and “converting portion in a pixel,” in line 12.

However, there is lack of proper antecedent basis for “the pixel” and “a pixel” in the claim language for the following reasons:

Claim 1, in line 2, recites “an imaging area including multiple two-dimensionally arranged pixels.”

Is the “pixel” that is claimed in line 3 different from line 2, 6 and 12 and vice versa.

Since there is more than one pixel claimed in the preceding limitation, there is a great deal of lack of clarity for “the pixel” and “a pixel” in the claim language in the meaning and scope. Therefore, the claim is indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 2 recites the limitation “solid-state image pickup device according to claim 1, characterized in that the surface of the photoelectric converting portion has a rectangular form missing at least one corner; and the collective lens is positioned at a substantial center of the rectangular form in a pixel in the center part of the imaging area,” in lines 1-5. However, the recited claim lacks clarity in its meaning and scope for the following reasons:

It is not clear what “the surface of the photoelectric converting portion has a rectangular form missing at least one corner” entails. Since the instant application device structure, a three dimensional structure the “photoelectric converting portion” will have six-sided rectangular

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surfaces and it is not clear which surface has been claimed. Therefore, the claim is indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

There are also similar problems in claims 2-4, 9, and 13.

Claims 2-8 and 10-12 are also rejected as being dependent of the rejected independent base claim.

Applicants' cooperation is requested in reviewing the claims structure to ensure proper claim construction and to correct any subsequently discovered instances of claim language noncompliance. See *Morton International Inc.*, 28USPQ2d 1190, 1195 (CAFC, 1993).

In light of the rejection 35 U.S.C. § 112 second Paragraph that set forth herein above, the following 35 U.S.C. 102(b) rejection of claims 1-13 is based on prior art which reads on the interpretation the claim language of the instant application as best as understood by the Examiner.

Claim Rejections - 35 USC § 102

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

5. Claims 1-7, 9, 10, and 13-16 are rejected under 35 U.S.C. 102(b) as being anticipated by Inoue et al. (US 6,211,509).

The rejection that was mailed on February 27, 2007 is maintained and repeated herein below as of record.

Re claim 1, Inoue et al. disclose a solid-state image pickup device characterized by comprising: an imaging area including plurality of two-dimensionally arranged pixel (see abstract), wherein each of the pixel has a collective lens (29) and a photoelectric converting portion (see Fig. 1A and abstract); the photoelectric converting portion (22) has a surface in an asymmetrical form (see Fig. 1A); the collective lens (29) is positioned above the photoelectric converting portion and at a substantial symmetrical center making up for the surface asymmetry in a pixel in a center part of the imaging area (see Fig. 1A); the collective lens (29) is placed at a position shifted more toward the center of the imaging area from a part on the symmetrical substantial center as a distance from the center of the imaging area to a pixel thereof increases (see Figs. 1A and 2A); and the collective lens has an amount of the shift depending on the degree of asymmetry of the surface of the photoelectric converting portion in a pixel positioned in an equal distance from the center of the imaging area (see Figs. 1A through 7E and related text in Col. 2, line 20 through Col. 10, line 25).

Re claim 2, as applied to claim 1 above, Inoue et al. disclose all the claimed limitations including the surface of the photoelectric converting portion (22) has a rectangular form missing at least one corner; and the collective lens is positioned at a substantial center of the rectangular form in a pixel in the center part of the imaging area (see Figs. 1A through 7E and related text in Col. 2, line 20 through Col. 10, line 25).

Re claim 3, Inoue et al. disclose a solid-state image pickup device characterized by comprising: an imaging area including plurality of two-dimensionally arranged pixel (see Abstract), wherein the pixel has a collective lens (29) and a photoelectric converting portion

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(25) (see Fig. 1A) ; the collective lens (29) is placed at a position shifted more toward the center of the imaging area as a distance from the center of the imaging area to a pixel thereof increases; and an amount of the shift of the collective lens is defined based on the height from a surface of the photoelectric converting portion of the collective lens and the thickness in the direction of depth of the substrate of the photoelectric converting portion such that an amount of light incident within the photoelectric converting portion can increase (see Figs. 1A through 7E and related text in Col. 2, line 20 through Col. 10, line 25).

Re claim 4, as applied to claim 3 above, Inoue et al. disclose all the claimed limitations including the photoelectric converting portion is inclined to a predetermined side within a pixel, and the collective lens (29) has an amount of shift depending on an amount of an inclination of the position of the photoelectric converting portion within each of pixels having an equal distance from the center of the imaging area (see Figs. 1A through 7E and related text in Col. 2, line 20 through Col. 10, line 25).

Re claim 5, as applied to claim 3 above, Inoue et al. disclose all the claimed limitations including the pixel further has multiple wires (27 22) provided through an insulating film (36), and the wires are placed at a position shifted toward the center of the imaging area like the collective lens (see Figs. 1A through 7E and related text in Col. 2, line 20 through Col. 10, line 25).

Re claim 6, as applied to claim 3 above, Inoue et al. disclose all the claimed limitations including the photoelectric converting portion is placed at a position shifted from the center of the imaging area toward the outside with respect to the surface (see Figs. 1A through 7E and related text in Col. 2, line 20 through Col. 10, line 25).

Re claim 7, as applied to claim 6 above, Inoue et al. disclose all the claimed limitations including an amount of the shift of the bottom of the photoelectric converting portion is increased as the distance from the center of the imaging area to a pixel thereof increases (see Figs. 1A through 7E and related text in Col. 2, line 20 through Col. 10, line 25).

Re claim 9, Inoue et al. disclose a solid-state image pickup device, characterized by comprising: an imaging area including multiple two-dimensionally arranged pixels (see Abstract), wherein the pixel has a photoelectric converting portion (25); a bottom of the photoelectric converting portion is placed at a position shifted from the center of the imaging area toward the outside with respect to the surface thereof in each of at least partial pixels of the multiple pixels (see Figs. 1A through 7E and related text in Col. 2, line 20 through Col. 10, line 25).

Re claim 10, as applied to claim 9 above, Inoue et al. disclose all the claimed limitations including an amount of the shift of the bottom of the photoelectric converting portion is increased as the distance from the center part of the imaging area to a pixel thereof increases pixels (see Figs. 1A through 7E and related text in Col. 2, line 20 through Col. 10, line 25).

Re claim 13, Inoue et al. disclose an electronic apparatus having a solid-state image pickup device, the apparatus characterized in that: the solid-state image pickup device has: an imaging area including plurality of two-dimensionally arranged pixel; the pixel has a collective lens (29) and a photoelectric converting portion (25); the collective lens (29) is placed at a position shifted more toward the center of the imaging area as a distance from the center of the imaging area to a pixel thereof increases (see Abstract and Fig. 1A); an amount of the shift of the collective lens is defined based on the height from a surface of the photoelectric converting

portion of the collective lens and the thickness in the direction of depth of the substrate of the photoelectric converting portion; and a bottom of the photoelectric converting portion is shifted from the center of the imaging area toward the outside with respect to the surface pixels (see Figs. 1A through 7E and related text in Col. 2, line 20 through Col. 10, line 25).

Re claim 14, Inoue et al. disclose a method of manufacturing a solid-state image pickup device comprising: forming a photoelectric converting portion (25) and collective lens (29) in each pixel of an imaging area, wherein the collective lens (29) is placed at a position shifted more toward the center part of the imaging area as a distance from the center of the imaging area to a pixel thereof increases (see Fig. 1A and abstract); and an amount of the shift of the collective lens is defined based on the height from a surface of the photoelectric converting portion of the collective lens and the thickness in the direction of depth of the substrate of the photoelectric converting portion such that an amount of light incident within the photoelectric converting portion can increase (see Figs. 1A through 7E and related text in Col. 2, line 20 through Col. 10, line 25).

Re claim 15, as applied in claim 14 above Inoue et al. disclose all the claimed limitations including that a bottom of the photoelectric converting portion is placed at a position shifted from the center part of the imaging area toward the outside with respect to the surface (see Figs. 1A through 7E and related text in Col. 2, line 20 through Col. 10, line 25).

Re claim 16, as applied in claim 15 above Inoue et al. disclose all the claimed limitations including an amount of the shift of the bottom of the photoelectric converting portion is increased as the distance from the center of the imaging area to a pixel thereof increases (see Figs. 1A through 7E and related text in Col. 2, line 20 through Col. 10, line 25).

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

7. Claims 8, 11, 12, 17, and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Inoue et al. (US 6,211,509) in view of Yamada (US 2005/0035376).

The rejection that was mailed on February 27, 2007 is maintained and repeated herein below as of record.

Re claim 8, as applied to claim 3 in Paragraph 6 above, Inoue et al. disclose all the claimed limitations including the photoelectric converting portion (22) includes an impurity region formed by performing ion-implantation into a semiconductor layer.

However, Inoue et al. do not specifically disclose the photoelectric converting portion formed by multiple ion implantation process.

Yamada discloses formation of the photoelectric conversion region by multiple ion implantation that includes an angle implantation (see Figs. 11-13) in order to suppress variation of readout voltage of the device (see Page 10, Paragraph [0130] through [0131]).

Therefore, it would have been obvious to one having ordinary skill in the art at the time of applicant(s) claimed invention was made to provide Inoue et al. reference with multiple ion-implantation process that includes angle implant during formation of photoelectric converting portion as taught by Yamada in order to suppress variation of readout voltage of the device.

Re claims 11 and 12, as applied to claim 9 in Paragraph 6 above, Inoue et al. disclose all the claimed limitations including the photoelectric converting portion (22) includes an impurity region formed by performing ion-implantation into a semiconductor layer.

However, Inoue et al. do not specifically disclose the photoelectric converting portion formed by multiple ion implantation process that includes an angle implantation.

Yamada discloses formation of the photoelectric conversion region by multiple ion implantation that includes an angle implantation (see Figs. 11-13) in order to suppress variation of readout voltage of the device (see Page 10, Paragraph [0130] through [0131]).

Therefore, it would have been obvious to one having ordinary skill in the art at the time of applicant(s) claimed invention was made to provide Inoue et al. reference with multiple ion-implantation process that includes angle implant during formation of photoelectric converting portion as taught by Yamada in order to suppress variation of readout voltage of the device.

Re claims 17 and 18, as applied to claim 16 in Paragraph 6 above, Inoue et al. disclose all the claimed limitations including the photoelectric converting portion (22) includes an impurity region formed by performing ion-implantation into a semiconductor layer.

However, Inoue et al. do not specifically disclose the photoelectric converting portion formed by multiple ion implantation process that includes an angle implantation.

Yamada discloses formation of the photoelectric conversion region by multiple ion implantation that includes an angle implantation (see Figs. 11-13) in order to suppress variation of readout voltage of the device (see Page 10, Paragraph [0130] through [0131]).

Therefore, it would have been obvious to one having ordinary skill in the art at the time of applicant(s) claimed invention was made to provide Inoue et al. reference with multiple ion-implantation process that includes angle implant during formation of photoelectric converting portion as taught by Yamada in order to suppress variation of readout voltage of the device.

Response to Arguments

8. Applicant's arguments filed on June 19, 2007 have been fully considered but they are not persuasive.

With respect to rejection of claims 1-7, 9, 10 and 13-16 under 35 U.S.C. § 102 (b), applicant's argue that "Inoue fails to disclose, teach, or suggest that the collective lens is placed at a position shifted more toward the center of the imaging area from a part on the symmetrical substantial center as a distance from the center of the imaging area to a pixel thereof increases... Inoue fails to disclose, teach, or suggest that the collective lens is placed at position shifted more toward the center of the imaging area from a part on the symmetrical substantial center as a distance from the center of the imaging area to a pixel thereof increases... Inoue fails to disclose, teach, or suggest that the collective lens has an amount of shift depending on the degree of asymmetry of the surface of the photoelectric converting portion in a pixel positioned at an equal distance from the center of the imaging area..."

In response to applicant's arguments, it is respectfully submitted that Inoue et al. '509 disclose all the claimed limitations including *collective lens is placed at a position shifted more toward the center of the imaging area from a part on the symmetrical substantial center as a distance from the center of the imaging area to a pixel thereof increases; the collective lens is placed at position shifted more toward the center of the imaging area from a part on the symmetrical substantial center as a distance from the center of the imaging area to a pixel thereof increase; and the collective lens has an amount of shift depending on the degree of asymmetry of the surface of the photoelectric converting portion in a pixel positioned at an equal distance from the center of the imaging area .*

Furthermore, applicant's arguments that drawings are not to scale has no merit because applicant's own drawings are not to scale too in the absence of quantitative dimensional measurements.

In many digital image sensor devices, an array of microlenses is placed near each pixel aperture on the sensor surface. The position and properties of microlens array control the optical path from the sensor surface to the photodetector. The microlenses concentrate photons incident within the pixel aperture onto a compact region at the substrate. The microlenses are intended to concentrate the photons onto the photodetector rather than allowing them to fall on non-photosensitive positions in the pixel floor. To concentrate photons the microlens properties must be coordinated with those of the imaging lens. Therefore, this requires the microlens to be positioned and arranged or placed such a way that shifted more toward the center of the imaging area from a part on the symmetrical substantial center as a distance from the center of the imaging area to a pixel thereof increases; the collective lens is placed at position shifted more

As depicted in Fig.1 above, Inoue et al. clearly show the microlens positioned to central part of photodiode. Inoue et al. also clearly disclose that the *focusing lens 29 is a microlens formed in each cell to form an optical image on the photodiode 25 of the cell*. In other word, the focal point of the lens **29** is directed toward the center of the photodiode **25**. Further, The drawings, as shown in Figs. 1-3 clearly teach the claimed subject matter of the instant application.

Claims are given to their broadest reasonable interpretation in light of the supporting disclosure. See *In re Morris*, 127 F.3d 1048, 1054-55, 44 USPQ2d 1023, 1027-28 (Fed. Cir. 1997). Limitations appearing in the specification but not recited in the claim are not read into the claim. See *In re Prater*, 415 F.2d 1393, 1404-05, 162 USPQ 541, 550-551 (CCPA 1969). See also *In re Zletz*, 893 F.2d 319, 321-22, 13 USPQ2d 1320, 1322 (Fed. Cir. 1989).

Therefore, the rejection of claims 1-7, 9, 10 and 13-16 under 35 U.S.C. § 102 (b) is deemed proper.

In addition, the rejection of claims 8, 11, 12, 17, and 18 under 35 U.S.C. 103 is deemed proper because the rejection of the base claims under 35 U.S.C. § 102 (b) is deemed proper.

Therefore, the *prima facie* case of obviousness has been met and the rejection under 35 U.S.C. § 103(a) is deemed proper.

Conclusion

9. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

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Correspondence

10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Brook Kebede whose telephone number is (571) 272-1862. The examiner can normally be reached on 8-5 Monday to Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Matthew S. Smith can be reached on (571) 272-1907. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Brook Kebede

Brook Kebede
Primary Examiner
Art Unit 2823

BK
August 24, 2007